CLAIMS

1. An apparatus (1) for providing a 3D image display comprising a frame of rows of pixels, comprising:

at least one display unit (2) including at least one row of display pixels (19) each of which includes sub-pixels (20) to display elemental regions of the image in different view directions,

an optical lens arrangement (8) configured to direct optical radiation from the different elemental regions into respective divergent beams (21a-21e) corresponding to the view directions,

a driver (15) to drive the pixels of the display unit so as to display elemental regions of rows of the image successively, and

an optical scanning system (9, 10, 12, 24, 25) to receive the divergent beams (21a-21e) from the lens arrangement for the rows successively and display them as rows (13) of the image frame.

2. The apparatus (1) according to claim 1 including a display screen (14), the scanning system (9, 10, 12, 24, 25) being operable to direct the beams corresponding to the successive rows (13) of the image frame onto the screen.

3. The apparatus (1) according to claim 2 wherein the screen (14) comprises a diffuser for spreading the beams in a direction transverse to the row direction.

4. The apparatus (1) according to claim 3 wherein the diffuser comprises lenticular lenses (23) generally parallel to the row direction.

5. The apparatus (1) according to any one of claims 1 to 4 further comprising means (5,6) for focusing the elemental regions of rows of images onto the optical lens arrangement (8).

6. The apparatus (1) according to claim 5 wherein the means (5,6) for focusing the elemental regions of rows of images onto the lens arrangement comprises a plurality of converging lenses (5,6) with different focal lengths in the horizontal and vertical direction in order to match the dimensions of the elemental region of rows with the dimensions of the optical lens arrangement.

7. The apparatus (1) according to any one of the preceding claims wherein the optical lens arrangement comprise lenticular lenses (8).

8. The apparatus (1) according to any one of the preceding claims wherein the scanning device (9, 10, 12, 24, 25) comprises a rotary mirror element (10) to reflect the divergent beams (21a-21e).

9. The apparatus (1) according to claim 8 wherein the rotary mirror element (10) is a rotating mirror or a rotating polygon with reflective surfaces.

10. The apparatus (1) according to claim 8 or 9 wherein the scanning system (9,10,12, 24, 25) further comprises a concave mirror (12) to receive the divergent beams (21) from the rotary mirror element (10) and display them as rows (13) of the image frame.

11. The apparatus (1) according to claim 10 wherein the scanning system (9, 10, 12, 24, 25) comprises a lens (9) positioned in relation to the rotary mirror element (10) and the concave mirror (12) such that the rotary mirror element does not perturb the focusing of the image in the direction transverse to the row direction.

12. The apparatus (1) according to claim 10 or 11 wherein the scanning system (9, 10, 12, 24, 25) further comprises side mirrors (24, 25), and wherein the side mirrors and the concave mirror (12) are configured to focus the

divergent beams (21a-21e) containing information from one pixel (19) onto a small area (28) of the rows (13) of the image frame.

13. The apparatus (1) of any one of the preceding claims wherein the pixels (19) contain enough subpixels (20) to provide enough elemental regions such that each of more than one observer (22a, 22b) can observe the 3D image simultaneously and each of the more than one observer sees a slightly different view.

14. The apparatus (1) of any one of the preceding claims wherein there are at least 50 elemental regions for each 3D image.

15. The apparatus (1) of any one the preceding claims wherein for each elemental region there is another elemental region such that the images relating to the two elemental regions are shifted by less or equal to the parallax between the eyes.

16. The apparatus (1) of any one of the preceding claims wherein a plurality of display units (2) are placed adjacent to each other in the direction parallel to the row direction and wherein the driver is configured to display different information on each display such that all the information corresponding to one row of the 3D image is displayed simultaneously across the plurality of the display units (2).

17. The apparatus (1) of any one of the preceding claims wherein a plurality of display units (2) are placed adjacent to each other in the direction transverse to the row direction and wherein the driver is configured to display information on the plurality of displays relating to different rows of the 3D image frame and the scanning system comprises a plurality of rotary mirror elements for scanning the information onto said rows.

18. A domestic video and television display comprising the apparatus according to any one of the preceding claims.

19. A method for providing a 3D image having a frame of rows of pixels, comprising:

providing successive displays (4) each including at least one row of display pixels (19) each of which includes sub-pixels (20) corresponding to elemental regions of the image in different view directions,

directing optical radiation from the different elemental regions into respective divergent beams (21) corresponding to the view directions, and

receiving the divergent beams (21) or the rows successively and displaying them as rows (13) of the 3D image frame.

20. The method of claim 19 further comprising spreading the light containing the divergent beams in a direction transverse to the row direction in order to enlarge the viewing angle in the direction transverse to the row direction.

21. The method of claim 19 or 20 further comprising displaying the 3D image on a display screen (14), and

separating the beams (21) from different elemental regions before they are displayed on the display screen (14).

22. The method of claim 19 comprising creating a 3D pixel (28) on the display screen (14) by directing all the separate beams corresponding to different subpixels (20) of the same pixel (19) onto the same small area (28) of the display screen (14), such that the 3D pixel emits light corresponding to different views of the same point of an image source in different directions.

23. The method of any one of claims 19 to 22 when used for domestic television and video projection.